

Patent Claims

1. Nanoparticulate UV protectant which has a silicon dioxide coating, characterised in that it is obtainable by hydrothermal treatment of a nanoparticulate metal oxide and subsequent application of a silicon dioxide coating.
2. Nanoparticulate UV protectant according to Claim 1, characterised in that the metal oxide is essentially titanium dioxide, which may optionally be doped with iron.
3. Nanoparticulate UV protectant according to at least one of the preceding claims, characterised in that the crystallite size of the nanoparticulate metal oxide in the nanoparticulate UV protectant, determined by the Scherrer method, is in the range from 5 nm to 100 nm, preferably in the range from 8 to 50 nm and particularly preferably below 25 nm, and the dimensions of the nanoparticulate metal oxide, which can be determined in a transmission electron microscope, are at a length of 5 to 150 nm and a width of 5 to 60 nm, preferably at a length in the range from 20 to 60 nm and a width in the range from 8 to 30 nm.
4. Nanoparticulate UV protectant according to at least one of the preceding claims, characterised in that the silicon dioxide coating is, based on the nanoparticulate UV protectant, 5 to 50% by weight, preferably 8 to 30% by weight and particularly preferably 12 to 20% by weight.
5. Nanoparticulate UV protectant according to at least one of the preceding claims, characterised in that the nanoparticulate UV protectant has a particle size determined by the Scherrer method in the range from 5 nm to 100 nm, preferably in the range from 8 to 50 nm and particularly preferably below 25 nm, and the dimensions of the nanoparticulate UV protectant, which can be determined in a transmission electron microscope, are at a length of 5 to 160 nm and a width of 10 to 70 nm, preferably at a length in the range from 30 to 70 nm and a width in the range from 18 to 40 nm.
6. Process for the preparation of a nanoparticulate UV protectant, characterised in that

- a) a nanoparticulate metal oxide is subjected to hydrothermal treatment and
- b) a silicon dioxide coating is subsequently applied.

5 7. Process according to Claim 6, characterised in that a nanoparticulate titanium dioxide is subjected to hydrothermal treatment in step a).

10 8. Process according to at least one of the preceding claims, characterised in that step a) is carried out in a sealed container at temperatures in the range from 40 to 360°C, preferably in the range from 80 to 220°C and particularly preferably in the range from 140 to 200°C.

15 9. Process according to at least one of the preceding claims, characterised in that step b) is carried out as a sol-gel process, in which a water-glass solution is preferably added to a suspension of the metal oxide.

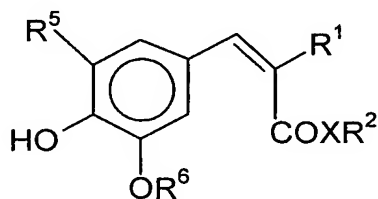
20 10. Process according to at least one of the preceding claims, characterised in that step b) is carried out at a pH kept constant in the range from pH = 2 to pH = 11, preferably in the range from pH = 5 to pH = 8, particularly preferably in the range from pH = 6 to pH = 7.

25 11. Process according to at least one of Claims 6 to 9, characterised in that step b) is carried out without pH regulation after prior pH adjustment of the suspension of the metal oxide to a value of pH = 7 to pH = 11, and the pH is subsequently lowered to a pH = 5 to pH = 8, preferably to a value of pH = 6 to pH = 7.

30 12. Process according to at least one of the preceding claims, characterised in that step b) is carried out at elevated temperature, preferably at a temperature in the range from 50°C to 100°C.

35 13. Composition having light-protection properties comprising at least one nanoparticulate UV protectant according to at least one of Claims 1 to 5 or a nanoparticulate metal oxide prepared by a process corresponding to at least one of Claims 6 to 12.

14. Composition having light-protection properties according to Claim 13, characterised in that it is a composition which can be applied topically, preferably a cosmetic or dermatological formulation.
- 5 15. Composition having light-protection properties according to Claim 13, characterised in that it is a composition selected from the group consisting of fibres, textiles, including coatings thereof, paints, coating systems, films and packaging for the protection of foods, plants or industrial products.
- 10 16. Composition having light-protection properties according to at least one of the preceding claims, characterised in that the composition comprises at least one organic UV filter, preferably a dibenzoylmethane derivative, in particular methoxy-tert-butylidibenzoylmethane, and/or a benzophenone derivative, such as 2-hydroxy-4-methoxybenzophenone.
- 15 17. Composition having light-protection properties according to at least one of the preceding claims, characterised in that the composition comprises at least one self-tanning agent, preferably dihydroxyacetone or a dihydroxyacetone derivative.
- 20 18. Composition having light-protection properties according to at least one of the preceding claims, characterised in that the composition comprises at least one photostabiliser, preferably conforming to the formula III



III,

25 where

R^1 is selected from $-C(O)CH_3$, $-CO_2R^3$, $-C(O)NH_2$ and $-C(O)N(R^4)_2$;

X is O or NH;

R^2 stands for a linear or branched C_{1-30} -alkyl radical;

30 R^3 stands for a linear or branched C_{1-20} -alkyl radical,

all R^4 , independently of one another, stand for H or linear or branched C_{1-8} -alkyl radicals

R^5 stands for H, a linear or branched C_{1-8} -alkyl radical or a linear or branched $-O-C_{1-8}$ -alkyl radical and

R^6 stands for a C_{1-8} -alkyl radical,

where the photostabiliser is particularly preferably bis(2-ethylhexyl) 2-(4-hydroxy-3,5-dimethoxybenzylidene)malonate.

19. Composition having light-protection properties according to at least one of the preceding claims, characterised in that the composition comprises one or more further UV filters, which are preferably selected from the group consisting of 3-(4'-methylbenzylidene)-dl-camphor, octyl methoxycinnamate, 3,3,5-trimethylcyclohexyl salicylate, 2-ethylhexyl 4-(dimethylamino)-benzoate, 2-ethylhexyl 2-cyano-3,3-diphenylacrylate, 2-phenylbenzimidazole-5-sulfonic acid and the potassium, sodium and triethanolamine salts thereof.
20. Composition having light-protection properties according to at least one of the preceding claims which is suitable for the protection of body cells against oxidative stress, in particular for reducing skin ageing, characterised in that it preferably comprises one or more antioxidants.
21. Composition having light-protection properties according to at least one of the preceding claims, characterised in that it is an emulsifier-free emulsion, preferably a Pickering emulsion.
22. Process for the preparation of a composition, characterised in that a nanoparticulate UV protectant according to at least one of Claims 1 to 5 or a nanoparticulate UV protectant prepared according to at least one of Claims 6 to 12 is mixed with a cosmetically or dermatologically suitable carrier and optionally further ingredients.
23. Use of a nanoparticulate UV protectant according to at least one of Claims 1 to 5 or of a nanoparticulate UV protectant prepared according to at least one of Claims 6 to 12 for the preparation of a composition having light-protection properties.

24. Use of a nanoparticulate UV protectant according to at least one of Claims 1 to 5 or of a nanoparticulate UV protectant prepared according to at least one of Claims 6 to 12 as UV filter.

5 25. Use of a nanoparticulate UV protectant according to at least one of Claims 1 to 5 or of a nanoparticulate UV protectant prepared according to at least one of Claims 6 to 12 for the stabilisation of UV filters, in particular dibenzoylmethane and dibenzoylmethane derivatives or benzophenone and benzophenone derivatives.

10 26. Use of a nanoparticulate UV protectant according to at least one of Claims 1 to 5 or of a nanoparticulate UV protectant prepared according to at least one of Claims 6 to 12 for the stabilisation of self-tanning agents, in particular dihydroxyacetone and dihydroxyacetone derivatives.

15 27. Use of a nanoparticulate UV protectant according to at least one of Claims 1 to 5 or of a nanoparticulate UV protectant prepared according to at least one of Claims 6 to 12 for incorporation into paints, coating systems, films, packaging, fibres, textiles and rubber or silicone rubber mouldings, such as
20 tyres or insulators.